Virginia Office of Emergency Medical Services
Division of Trauma/Critical Care
Prehospital and Inter-hospital
State Stroke Triage Plan

Approved by Board of Health 11/30/2017
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Executive Summary

Under the Code of Virginia § 32.1-111.3, The Office of Emergency Medical Services, acting on behalf of the Virginia Department of Health, has been charged with the responsibility of maintaining a Statewide Stroke Triage Plan. The Statewide Stroke Triage Plan establishes a strategy through formal regional stroke triage plans that incorporate each region's geographic variations and acute stroke care capabilities and resources. The Commonwealth of Virginia recognizes three levels of stroke certification (a Certified Stroke Center) consistent with recommendations of the Brain Attack Coalition. These are Comprehensive Stroke Centers, Primary Stroke Centers, and Acute Stroke Ready Hospitals. There are multiple certifying bodies including the Joint Commission, DNV, and potentially others.

The purpose of the Statewide Stroke Triage Plan is to establish a uniform set of criteria for the prehospital and inter-hospital triage and transport of acute stroke patients. Formal regional or local stroke triage plans may augment the State Stroke Triage Plan to acknowledge and address variations in each region's EMS and hospital resources. This State Stroke Triage Plan, and the related regional plans, addresses patients experiencing an "acute stroke." For the purposes of this document, "acute stroke" is defined as any patient suspected of having an acute cerebral ischemic or hemorrhagic event. The primary focus of the plan is to provide guidelines to facilitate the early recognition of patients suffering from acute stroke and to expedite their transport to a center able to provide definitive care within an appropriate time window.

It is very important to note that because of the continuing evolution of scientific evidence indicating successful management of acute stroke regardless of time of onset, EMS *providers are encouraged to initiate real-time contact with regional or local medical direction to discuss individual cases that may fall outside of their established agency protocol.* The closest hospital may not necessarily be the most appropriate hospital for that patient. In selected cases it may be determined that expeditious transfer or transport directly to a Certified Stroke Center may be of benefit for a specific patient. Some selected acute stroke types may benefit from intervention *for an extended period* following symptom onset (Acute Ischemic Stroke-Healthcare Professional Resource Page). Regardless of time of onset the sooner an acute stroke is treated, the better the potential outcome ("Time is Brain"). Based on an individual patient's time of symptom onset and following discussion with Medical Control, EMS should carefully consider what mode of transport would be most appropriate to transport the patient expeditiously to a Certified Stroke Center.

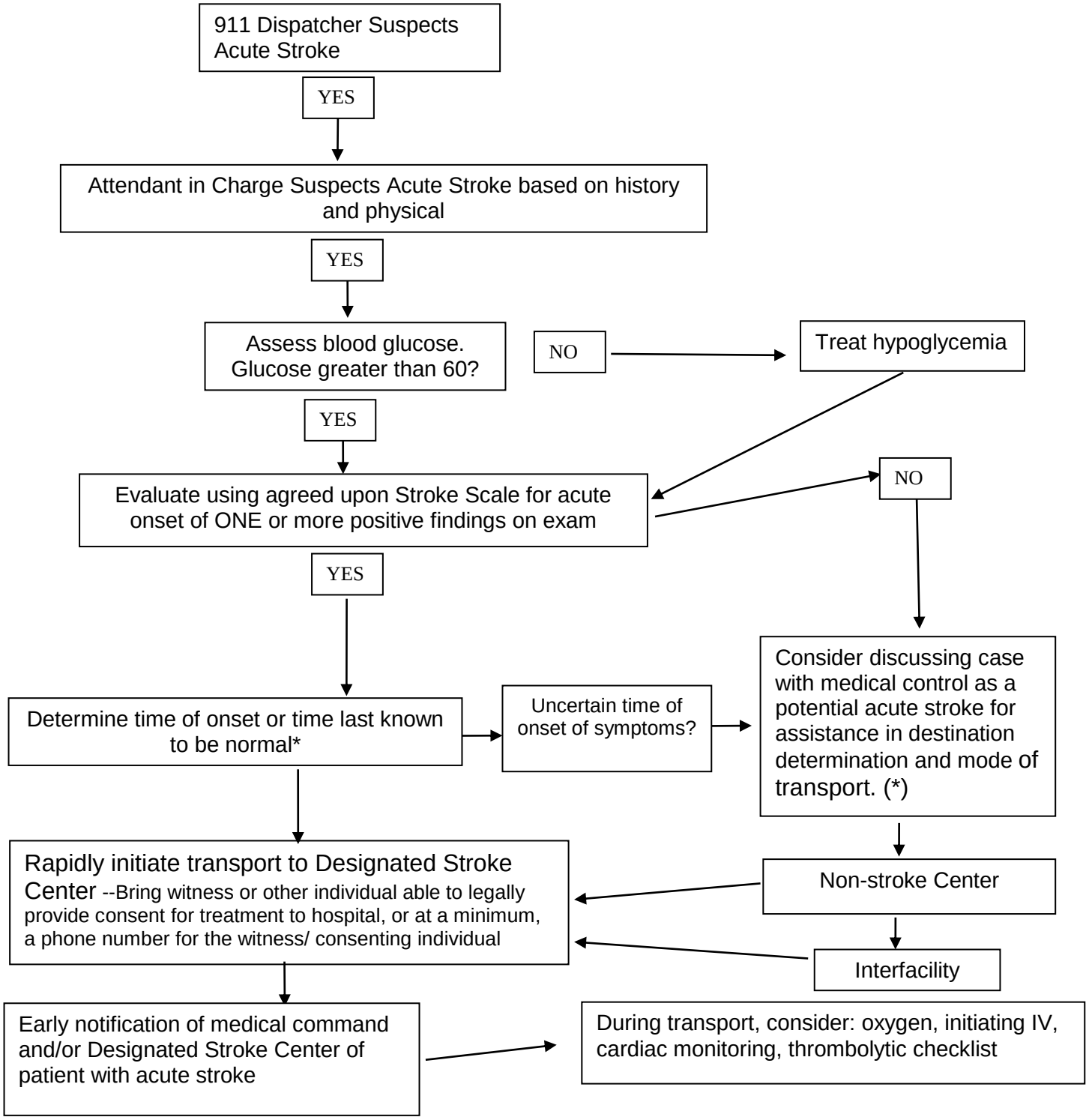
Pre-Hospital and Inter-hospital Triage Criteria

Individual EMS regions are best qualified to assess the capabilities of their EMS and hospital stroke management resources and provide direction to EMS agencies within their regional guidelines. The default destination for acute stroke patients should be a Certified Stroke Center. When acute stroke patients cannot be transported directly to a Certified Stroke Center in a timely manner, consideration may be given to transport to a closer hospital. Various hospitals meet many of the components of a Certified Stroke Center based on national survey results and would be the next logical choice. The closest hospital may not be the most appropriate hospital. Resource information on Certified Stroke Centers can be found on The Joint Commission website (https://www.jointcommission.org/), the DNV website (DNV GL - Healthcare | DNV GL - Healthcare) and The Healthcare Facilities Accreditation Program (HFAP - Primary Stroke Center Certification Program).

These considerations should be addressed specifically within the regional plan in a manner consistent with this state stroke plan, and should be updated as hospital resource availability changes. Regional plans should provide EMS systems with plans for situations where patients would be transported to non-stroke centers, as well as specific guidance for use of helicopter EMS (HEMS) for transport to Certified Stroke Centers. It is recommended that if HEMS is utilized, the destination optimally should be a Comprehensive Stroke Center or center with Comprehensive level capabilities (e.g. 24-7 Neurosurgery and Neuro-intervention). Interfacility transfer plans should address both non-stroke centers and the post thrombolytic transfer of patients for interventional therapy.

Non-stroke center hospitals should have transfer guidelines and agreements in place for the expeditious and appropriate management of acute strokes when the care required exceeds their capabilities. This is especially critical for transfer of patients following thrombolysis since specific protocols must be followed to diminish the risk of cerebral or systemic hemorrhagic complications. If the patient has received, or is receiving thrombolytic therapy, it is the responsibility of the sending facility to ensure that the transporting agency is staffed with providers that have received appropriate training in the monitoring of this patient population. (See Appendix B for a sample post IV tPA EMS transfer checklist)

Acute Field Stroke Triage Decision Scheme



(*) EMS providers are encouraged to initiate real-time contact with regional or local medical direction to discuss individual cases that may fall outside of their established agency protocol onset of symptoms guidelines. Recall that patients with specific acute stroke types may benefit from intervention up to 24 hours, although the sooner an acute stroke is treated, the better the potential outcome. Based on patient time of onset and discussion with Medical Control, consider whether use of helicopter EMS will offer potential benefit to the patient, either in time to Certified Stroke Center, or for critical care management expertise. EMS does not determine whether a patient is excluded from any or all therapeutic options. Final decisions regarding patient eligibility for any given intervention will be determined by the receiving physician(s).

Guidance Materials

Use of Validated Stroke Screening Scale

All patients suspected of having an acute stroke should undergo a formal screening algorithm. Use of stroke algorithms is associated with higher EMS stroke recognition and sensitivity.[1] The results of the stroke screening must be documented in the electronic prehospital medical record and on any written handoff form left at the receiving hospital. ANY abnormal (positive) finding which is suspected or known to be acute in onset is considered an indicator of potential acute stroke.

It should be recognized that there are numerous scales available for stroke screening (Cincinnati Prehospital Stroke Scale BE FAST, RACE, LAMSS, VAN), some of which are designed to detect any acute stroke, and some of which are designed to identify large vessel occlusion. Since there is not definitive evidence favoring one scale over another, and numerous scales are available, the regional EMS councils should consider which scale to use, and evaluate those in the field for applicability to their region. The Virginia Office of EMS and the Virginia Stroke Systems Taskforce have created a reference document that consists of various stroke scales for use in identifying acute stroke and large vessel occlusions. The document provides references to the use of the scales in the pre-hospital environment. The link to the document can be found on the **Stroke Related Resources** page of this document.

Local/Regional Protocols

Local and regional prehospital patient care protocols for acute stroke should include:

- An initial/primary assessment

- Focused assessment including:
    - Blood glucose level (if authorized to perform skill)
    - Documented time of onset or time last known to be normal
    - Documentation of the agreed upon regional screening tool for acute stroke and large vessel occlusion (e.g. RACE, LAMSS, VAN)
    - Pertinent history to include mention of acute stroke mimics (i.e. seizures, migraines, hypo/hyperglycemia and others as deemed appropriate). Pertinent medical history that might affect thrombolytic administration (i.e. pregnancy, seizure at onset, terminal illness and others as deemed appropriate) is listed on the Sample Acute Stroke Thrombolytic Checklist in Appendix A.

- Appropriate treatment for hypoglycemia. IV access and cardiac monitoring if available, reassessment of neurologic exam and stroke scale. Contact with Medical Control and/or receiving hospital to give pre-alert of potential acute stroke patient.

- Transport criteria that direct acute stroke patients with stable airway and without hypotension to Certified Stroke Centers within the agencies' transport geography. Real-time contact with regional or local medical direction may be freely used to discuss the individual patient case to determine whether transport directly to a Certified Comprehensive Stroke Center (if available within the region) would be of benefit to that specific patient.

[1] 1. J. Adam Oostema, M., John Konen, B., Todd Chassee, M., & Mojdeh Nasiri, M. (2015). Clinical Predictors of Accurate Prehospital Stroke Recognition. Stroke, 2015 1513-1517. DOI: 10.1161/STROKEAHA.115.008650

- EMS Regions incorporate specific strategies appropriate to their area to assure that acute stroke patients are able to access specialty resources for acute stroke intervention and management. There should be recognition that some patients may benefit from stroke interventions well outside of the usual time windows, and rapid evaluation with advanced imaging may be the only way to identify and select those patients. Thus, transfer to stroke centers with advanced imaging capabilities such as CT/CTA, MRI, and Angiography is recommended. Examples may include partnerships with acute stroke specialists at the Certified Stroke Center who can provide input on specific patient cases in a timely manner to either the Medical Control physician or directly to the EMS provider.

- For regions wishing to include a thrombolytic checklist, see Appendix A for Sample Acute Stroke Thrombolytic Checklist. EMS does not determine whether a patient is excluded from any or all therapeutic options. Final decisions regarding patient eligibility for any given intervention will be determined by the receiving physician(s).

Acute Stroke Patient Transport Considerations

MODE OF TRANSPORTATION: EMS Patient Care Protocols should address mode of transport considerations. Each jurisdiction is unique in its availability of EMS and acute stroke care resources. Consideration should be given to the hospital(s) that is/are available in the region and the resources that they have available to acute stroke patients when developing plans and protocols, as well as EMS system capacity.

RAPID TRANSPORTATION: Because stroke is a time-critical illness, time is of the essence, and EMS should rapidly initiate transport once acute stroke is suspected. Consideration should also be given to prehospital resources including use of HEMS available at the time of the incident, and other conditions such as transport time and weather conditions. Use of HEMS can facilitate acute stroke patients reaching Certified Stroke Centers in a timeframe that allows for acute treatment interventions. **The likelihood of benefit of acute stroke therapy decreases with time**, **but there are several therapy options which offer definite benefit *for an extended period* following symptom onset** (Acute Ischemic Stroke-Healthcare Professional Resource Page). Interventions may include any of the following: specialty physician or Neurologic ICU capability, advanced radiologic evaluation, or life-saving emergent procedures.

Field transports of acute stroke patients by helicopter as defined in this plan:

1. Should significantly lessen the time from scene to a Certified Stroke Center compared to ground transport.
2. Should be utilized to expeditiously transport acute stroke patients to the closest appropriate certified stroke center. Given cost and risk of utilization of a HEMS resource, it is recommended that the patient should be transported directly to a Certified Comprehensive Stroke Center if feasible.

Stroke Triage Quality Monitoring

The Virginia Office of EMS (OEMS), acting on behalf of the Commissioner of Health, will report aggregate acute stroke triage findings on an intermittent basis, but no less than annually, to assist EMS systems and the Virginia Stroke Systems Task Force improve the local, regional and Statewide Stroke Triage Plans. A de-identified version of the report will be available to the public and will include, minimally, as defined in the statewide plan, the use of and the completeness of, the prehospital Stroke assessment, under triage to Certified Stroke Centers in comparison to the total number of acute stroke patients delivered to hospitals and HEMS utilization. The program reports shall be used as a guide and resource for health care providers, EMS agencies, EMS regions, the Virginia Office of EMS and the Virginia Stroke Systems Task Force. Additional specific data points to be collected within the EMS prehospital patient care report (written or electronic) will be established collaboratively between OEMS and VSSTF. Information to be contained in routine reports on both system and patient-level indicators and outcomes will be developed by OEMS in partnership with VSSTF to guide further system development in a patient focused way.

Hospitals, EMS Regions, and EMS agencies are encouraged to utilize their performance improvement programs to perform quality monitoring and improve the delivery of acute stroke care within their regions.

Stroke Related Resources

Certified Stroke Centers

The process of Stroke Certification is entirely voluntary on the part of the hospitals and identifies hospitals that have established and maintain an acute stroke program that provides a specific level of medical, technical, and procedural expertise for acute stroke patients. Certification ensures that the hospital is prepared to provide definitive acute stroke care at all times and has an organized approach to providing clinical care, performance improvement, education etc. Neither the Commonwealth of Virginia government, nor the Virginia State Stroke System Task Force (VSSTF) certifies stroke centers.

Link to Joint Commission Certified Stroke Centers

- Certification Data Download - Data Download | QualityCheck.org

Link to DNV Certified Stroke Centers

- DNV GL - Healthcare | DNV GL - Healthcare

Link to a map of Virginia Stroke Certified Hospitals

- Acute Care Stroke Care Hospitals

Virginia Stroke System Web page

- Virginia Stroke Systems Task Force

Virginia Office of EMS Stroke Web page

- Virginia Stroke System-Emergency Medical Services

The Joint Commission

- What is Accreditation? | Joint Commission

American Heart Association

- Stroke Resources for Professionals

National Stroke Association

- Stroke Resources | Stroke.org

Centers for Disease Control and Prevention:

- Stroke Information | cdc.gov

Appendix A: Sample Thrombolytic Checklist

NOTE: Exclusions on this checklist are not absolute. Final decisions regarding patient eligibility for any given intervention will be determined by the receiving physician(s).

Date:_____ Time:_____EMS Unit: _____

PHOTOCOPY THIS FORM AND LEAVE COPY WITH ED PHYSICIAN OR NEUROLOGIST AT BEDSIDE

Patient Name:_____ Age:_____

Estimated .weight:_____lbs/kg

1. Did patient awaken with symptoms? Yes / No
2. Time last known to be normal: _____
3. Time of symptom onset: _____
4. Onset witnessed or reported by: _____
5. Witness/Family or other individual able to legally provide consent for treatment coming to Emergency Department? _____ [ENCOURAGE TO DO SO].

If not, phone # where such individuals will be immediately available for calls from hospital staff to assist in giving additional patient history and consent.

( ) -

Cincinnati Stroke Scale Score:

Symptoms from **Cincinnati Stroke Scale** (circle abnormal findings)

ANY ONE FINDING = POSSIBLE STROKE=MINIMIZE ON SCENE TIME

FACIAL DROOP:	R	L	**1 2 3**
ARM DRIFT:	R	L	
SPEECH:	slurred	wrong words	mute /unable to speak

Possible Contraindications (check all that apply)

Current use of anticoagulants (e.g., warfarin sodium)	Yes	No	?
Has blood pressure consistently over 180/110 mm Hg	Yes	No	?
Witnessed seizure at symptom onset	Yes	No	?
History of intracranial hemorrhage	Yes	No	?
History of GI or GU bleeding, ulcer, varices	Yes	No	?
Is within 3 months of prior stroke	Yes	No	?
Is within 3 months of serious head trauma	Yes	No	?
Is within 21 days of acute myocardial infarction	Yes	No	?
Is within 21 days of lumbar puncture (spinal tap)	Yes	No	?
Is within 14 days of major surgery or serious trauma	Yes	No	?
Is pregnant	Yes	No	?
Abnormal blood glucose level (<50 or >400): FSBS (if done):	Yes	No	?

Receiving Site/Physician Printed Name: _____Time_____

EMS Provider Name: _____Signature_____

Appendix B: ODEMSA Stroke Post-IV t-PA EMS Transfer Check Sheet
See next page

ODEMSA Stroke Post-IV t-PA EMS Transfer Check Sheet

Note: Patient will be transported with minimum of paramedic-level care

All questions regarding patient care must be referred to the receiving physician

Receiving Hospital: _____

Physician: _____

Phone Number: _____

Contact Number for family: _____

Prior to Departure – ***to be completed together by ED staff and transferring paramedic***

- ☐ Verify SBP < 180; DBP < 105 – sending hospital must stabilize if above limit
- ☐ Perform and document neurological exam to establish baseline neurological status
- ☐ If t-PA to continue during transport, complete "t-PA Dosing and Administration Communication Form" on back of this sheet
- ☐ If IV pump tubing is not compatible with transport pump:
  - Add extension tubing with a cartridge adaptable to transport pump, if available OR
  - Hold patient in ED until t-PA infusion is completed

During Transport

- ☐ Replace t-PA bottle with 0.9% NS when bottle is empty and before pump alarms "air in line" or "no flow above"
- ☐ Continue infusion at current settings until preset volume is completed
- ☐ Continuous cardiac monitoring
  - Call receiving physician if hemodynamically unstable or symptomatic from tachycardia or bradycardia
- ☐ Continuous pulse oximetry monitoring
  - Apply oxygen to maintain O2 sat > 94%
- ☐ Maintain NPO including medications
- ☐ Perform and record neuro checks every 15 mins
  - Cincinnati Pre-Hospital Scale
  - GCS and pupil exam
  - Include assessment for changes in initial or current symptoms or onset of new stroke-like symptoms
- ☐ Monitor and document vital signs every 15 mins **on opposite arm from t-PA infusion site**
- ☐ Maintain head of bed 30 degrees
- ☐ Avoid venipuncture or other invasive procedures unless absolutely necessary after t-PA start due to risk of bleeding

Blood Pressure Management

- ☐ Keep SBP < 180 and DBP < 105
  - Turn off pump and call receiving physician for further instructions
  - IV Labetalol (10 mg) ***(provided by hospital)*** Increase by 2mg/min every 10 mins (to a max of 8mg/min) until SBP < 180 and/or DBP < 105
  - IV Nicardipine (0.1 mg/mL) infusion ***(provided by hospital)*** Increase dose by 2.5mg/hr every 5 mins (to max of 15mg/hr) until SBP < 180 and DBP < 105

Complication Management

- ☐ Monitor for acute worsening of neurological condition or severe headache, acute hypertension, nausea, or vomiting
  - Stop t-PA infusion if still being administered
  - Call receiving physician for further instructions and to update receiving hospital
  - Continue to monitor vital signs and perform neurological exam every 15 mins
- ☐ Monitor for signs of allergic reaction: mouth or throat edema, difficulty breathing, etc
  - Stop t-PA infusion if still being administered
  - Treat allergic reaction according to agency protocol
  - Notify receiving hospital
- ☐ Monitor for other bleeding or hematomas at infusion/puncture sites or in urine or emesis
  - Apply direct pressure to any sites
  - Notify receiving hospital

Additional Instructions

_____

_____

_____

NOTE: ***Leave copy of MIVT or ePCR, EKG strips, and serial vital signs/neuro checks with RN at receiving hospital***

_____

Transferring Physician Signature Date/Time

Patient Sticker – sending hospital	Patient Sticker – receiving hospital

t-PA Dosing and Administration Communication Form

- This page is to be completed by transferring RN and EMS Transport team
- Verify/confirm the following dosing and pump settings prior to departure:

	ED RN Initials	EMS Transport Initials
Total t-PA dose to be given: _____mg		
Excess t-PA discarded before hanging on pump: _____mg Amount remaining at time of transport: _____mL		
Bolus dose: _____mg Time given:_____		
Continuous Infusion: • Dose: _____mg Time started:_____		
• Rate: _____mg/hr **Estimated** time of completion: _____		
Actual stopped/completed time:_____		
Stopped early due to: _____		
Total amount t-PA received: _____mg EMS administered _____mL in transport **Switch to bag of 0.9% NS KVO after t-PA is finished**		

Signature/Title	Initials	Signature/Title	Initials

EMS Transport Team to hand off this completed medical record to RN at receiving hospital

Patient Sticker – sending hospital	Patient Sticker – receiving hospital

Reference: AHA Guidelines for the Management of the Ischemic Stroke Patient, January 2013